

A miniaturized GC/MS Instrument for Spaceflight Applications

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ABSTRACT

Miniaturized chemical instrumentation will be needed for spaceflight applications where factors such as reduction in payload requirements and enhanced robustness are important. In response to this need, we have developed miniaturized GC/MS instrumentation which combines chemical separations by gas chromatography (GC) with mass spectrometry (MS) to provide positive identification of chemical compounds from analysis of their ion fragments. Our design approach utilizes MEMS-based gas chromatography components coupled with a miniature quadrupole array mass spectrometer. Key design issues include low power, robustness, low flow rates to minimize vacuum pumping requirements, and the use of a modular design approach to provide adaptability for various applications. Among the potential applications for such instrumentation are scientific measurements in unmanned planetary missions and environmental monitoring of space habitats.

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